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INFORMATION-AGE DECISIONMAKING: DEVELOPING A TOOL KIT FOR FUTURE LEADERS

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INFORMATION-AGE DECISIONMAKING:

DEVELOPING A TOOL KIT FOR FUTURE LEADERS

AN INDIVIDUAL STUDY PROJECT

by

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ABSTRACT

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This strategic study examines the changing decisionmaking landscape and offers a summary of the challenges facing current and future decisionmakers. It critically questions the Army's educational system and the wisdom of maintaining a purely analytical decisionmaking model for the military in light of emerging information technologies and organizational changes. It offers a defense of analytical decisionmaking and suggests that, in some situations, especially when the media's influence comes into play, it will continue to be the model of choice long into the future. It examines situational factors associated with future decisionmaking and predict the impact of each. The study concludes that future decisions can best be made through a combination of several decisionmaking models ranging from analytical to intuitive, with emphasis on the potential of intuitive models. A decisionmaking continuum graphically displays the range of several situationally-based decisionmaking methodologies.

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I. **INTRODUCTION.**

Although much has been written recently on many aspects of the transition to the information age, little has been written about the impact of information technology on decisionmaking. The power of shared information and the ability to manipulate communications media will challenge long-standing institutions and accepted techniques, including the way we make decisions.[1]

The future military will be challenged by an environment of unprecedented complexity, diversity, speed, and ambiguity. Critical decisions will be more complicated, will be delivered faster, and will have consequences for a future which has little in common with the past. The transition from the industrial age to the information age portends far-reaching implications for the military as it transforms itself into an internetted, digitized, and efficient warfighting organization that exploits information and digital technologies to create synergy among its operating systems, organization, and components.[2]

The military has traditionally used a linear, analytical decisionmaking model which stresses rationality, assuming that uncertainty can be reduced with increased information. The technical term for the military's analytical decisionmaking model is "multiattribute utility analysis."[3] To support this model, systems are being developed to provide all relevant information. In so doing, however, few have questioned whether the model itself remains appropriate as the information age matures. As information and digital technologies have been introduced, we are learning that an over-reliance on information can lead to paralysis.[4]

The theory that information technology will reduce uncertainty has been readily accepted, but it has never been proven in any practical application, to the best of my knowledge. We may very well be developing and purchasing expensive information systems, predicated on an analytical decisionmaking model which may have only limited value in the information age. Thus it is prudent to assess the future environment and correspondingly to reassess the way we make decisions. Gary A. Klein, an expert in applied cognitive psychology, observes that:

> "it's about time to acknowledge the theories and ideals of decisionmaking we have held for 25 years are inadequate and misleading, having produced unused decision aids, ineffective decisionmaking training programs and inappropriate doctrine."[5]

This study will examine the changing decisionmaking landscape and offer a summary of the challenges facing current and future decisionmakers. It challenges our current education system and the wisdom of promulgating a purely analytical decisionmaking model for the military in light of emerging information technologies and organizational changes. Nonetheless, the study defends analytical decisionmaking and suggests that, in some situations, especially when the media's influence comes into play, it will continue to be the model of choice long into the future. The study then analyzes a number of situational factors associated with future decisionmaking and predicts the impact of each. It concludes that future decisions can best be made through a combination of several decisionmaking models, ranging from analytical to intuitive, with emphasis on the potential of intuitive models. The emerging requirement for intuitive decisionmaking will necessitate institutional change. A decisionmaking continuum

graphically depicts the range of several situationally-based decisionmaking

methodologies that our future military leaders may call upon.

II. <u>CRITICAL THINKING AND ITS EFFECT ON DECISIONMAKING.</u>

The United States military has always been a performance-based organization--

and will remain so. The military culture rewards action--often at the expense of critical

and creative thought. Disciplined *thinking* and *doing* are not mutually exclusive, but are

interdependent.[6] The way we think colors the in which we make decisions. Therefore,

prior to examining the methodologies by which we will make decisions in the

information age, I will first consider how we are likely to think. Paul Harig said recently

that "the complexity of life may produce corresponding changes in the complexity of the

mind."[7] He went on to elaborate that future military leaders (he calls them "digital

generals") "might not just *communicate* differently but will actually *think* differently

from their predecessors."[8] Similarly, Richard Paul, observed in <u>*Critical Thinking,*</u> that:

> "we must sooner or later abandon the traditional attempt to
> teach people *what* to think. We must concentrate instead
> on teaching ourselves *how* to think, thus freeing us to think
> for ourselves, critically, fairmindedly, and deeply."[9]

I agree. In the face of accelerating change and increasing environmental complexity, we

seem to have little choice.

Decisionmaking serves as the critical link between thought (and intuition) and

action, the nexus where **thought + action = <u>performance</u>**.[10] (See Figure 1.) The *thought*

component of the above formula reflects a blend of past, present, and future perspectives.

Critical and conceptual thinking in the present, tempered with historical perspective, and

coupled with a creative and visionary view of the future will ensure the quality and sustained relevance of our thinking. Thought <u>alone</u> is of dubious utility in an action-based organization such as the military. Like learning, thinking requires action to be truly real.[11] As depicted in Figure 1, decisionmaking is the critical link that ensures practical and effective implementation of quality thinking. In light of the paradigm shift we are experiencing, it is critical that we examine the way in which we currently make decisions. Such an examination will enable us to develop effective decisionmaking alternatives--to link critical, creative thinking and intuitions to actions which yield effective performance, the cornerstone of our military culture.
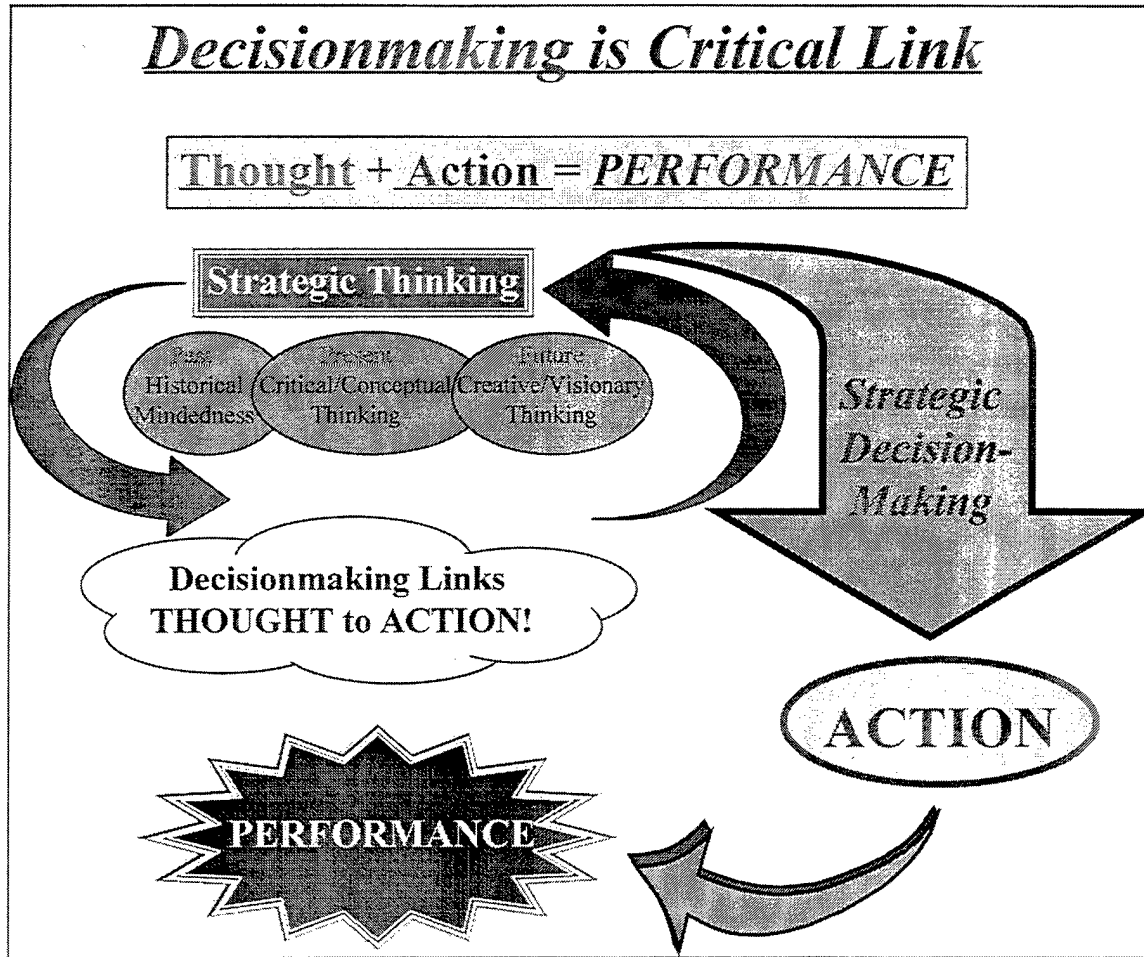
Figure 1: Thought, Action, Performance Relationship[12]

III. **THE ENVIRONMENT.**

The emerging information-age environment will be characterized by uncertainty, decentralization, dynamic systems, increased criticality of decisions made with little lead time, information overload, globalization, multicultural networks, and reduced "flash-to-bang" time for decisions (caused by an omnipresent media equipped with real-time broadcast capability). Dynamic complexity will increase, often blurring the relationship between cause and effect.[13]

Virtual or network organizations will emerge in which pockets or modules will be linked/networked. Organizations will be tailorable and modular, making distributed information management essential. Future organizations will often represent a temporary alliance of groups that come together to exploit a strategic opportunity.[14] We're already seeing early examples of this type organization in the civilian sector. For example, to take advantage of the rapidly developing notebook computer market, AT&T worked with Japan's Marubeni Trading Company and with Matsushita Electric Industrial Company to move quickly into production of its' Safari notebook computer.[15] AT&T used a network organization to quickly and efficiently design, manufacture, and market their computer by integrating specific areas of expertise of several different companies.[16] The strength of virtual or network organizations is the ability, through collaboration, to combine the strengths of several organizations to achieve results more quickly and with greater expertise than any of the individual companies possess alone.[17] The potential weakness of virtual organizations, however, is in the areas of common goals, coordination of effort, and authority structure.[18] Nonetheless, within virtual organizations, shared vision and situational awareness will become essential and will be a defining characteristic of high performing enterprises.

IV. THE IMPACT OF INFORMATION TECHNOLOGY ON FUTURE DECISIONMAKING.

Information technology yields vast amounts of data which can lead to information overload or, at a minimum, information congestion.[19] dt ogilvie warns that:

"although analytical decisionmaking models call for as
much data as possible in order to reduce uncertainty, much
of the data is not useful for complicated military situations
and human decisionmakers face cognitive limitations that
technology does not."[20]

ogilvie suggests that information technology may actually increase decisionmaking

complexity because:

"interconnections between information sources can lead to
heightened opportunities for ambiguity, a condition in
which added information only increases the pool of
equivocal interpretations, and hence, equivocality
(information can mean two or more different things, and
there is no logical resolution to the ambiguity). As more
connections and entities exist in the environment,
complexity increases."[21]

The belief that information technology will reduce uncertainty is simply implausible.

Information overload can lead to paralysis. A recent tactical example of this

phenomenon was discovered during a digitized rotation at the U.S. Army's National

Training Center at Fort Irwin, California. During the training, nearly every soldier was

equipped with high technology sensors which transmitted raw, real-time battlefield data

directly to the task force commander. When the friendly task force had been destroyed

by the opposing force and end-of-exercise (ENDEX) was declared, the task force

commander had not read 867 screens of data made available during the exercise. The

critical information needed to cue the commitment of his counterattack force was lost in

the noise of voluminous information. The counterattack force was committed late, so the

task force was destroyed in detail as they "reacted" to the enemy attack.[22]

Information can have an almost intoxicating effect. "Receiving data from

technology imposes a seductive sense of objectivity on a murky situation. A big problem

is that the mere existence of volumes of data gives the impression that the data must have meaning. In the future, noise may increasingly be interpreted as a signal, or at least give the illusion that a signal is there."[23]

As we seek to take advantage of emerging technologies, we must guard against developing information-rich but interpretation-poor systems. The imposition of unprecedented volumes of information on industrial age analysis and interpretation apparatus will result in little advantage to future decisionmakers. Although digital technologies enable the rapid transmission of data, the task of analyzing available data and translating it into knowledge is a manpower intensive function. To date, at least in the military, we've seen increased emphasis on fielding systems designed to provide information, without a corresponding increase in the effort to resource systems which can translate information into usable knowledge.

A number of other concerns cloud the future decisionmaking horizon. "The ready access to information by ever wider audiences may constrain decisions in order to avoid high visibility actions that can be easily divorced from context into misleading soundbites"[24] (the CNN Effect). Media analysis of military operations now begin while the actions are still in progress. Incremental decisions, taken out of context, are scrutinized, potentially denying military leaders' opportunities to frame the discussion for senior military and civilian leaders, and for the American people. The military may as a result be forced into a reactive mode, exercising "spin control" rather than framing the totality of the discussion. "The heightened vigilance from widening audiences enabled by technological progress can impose severe psychological pressures on individuals and

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may lead to employing suboptimal rules or regulations over discretionary judgment, hiding the problem, or ratcheting the decision up the organizational hierarchy. The deleterious impact of such scrutiny could lead decisionmakers to focus on appearances, encouraging them to constrain actions to what is momentarily acceptable, potentially to the detriment of the long term goal."[25]

Thus the military is now challenged to develop a decisionmaking structure which recognizes the inherent inability to process all available information and which provides guidance for when it's OK to make a decision. There is no small degree of risk here, as high-profile mistakes (that could have been averted with the processing of more information) will surely become fodder for media analysts.[26] Envision the next generation's Sam Donaldson saying indignantly to General X, "If you'd have simply accessed information source Y, as we did, you would have realized the folly of your decision."

The CNN Effect therefore may continue to dictate the use of analytical decisionmaking because it provides the best audit trail and justification for important decisions. Yet such reliance on an old "safe" model could prove devastating to the development of intuitive leaders. In the original Star Trek series, Captain Kirk often made intuitive, seemingly illogical, and emotionally biased decisions. Of course, in the science fiction genre Captain Kirk's seemingly intuitive and ostensibly irrational decisions were the basis for his greatest successes. In today's environment of media scrutiny and zero defects mentality, reality dictates a more analytical process than Captain Kirk's "gut-feel" decisionmaking. It is difficult to explain the death of hundreds

of Americans by saying "I had a *feeling* it would work, so I went with it." This potential

inhibition of intuition is unfortunate. As Harig declared, "Intuition allows a commander

to focus rapidly on feasible solutions when time for systematic analysis is unavailable."[27]

In spite of the CNN Effect, we must develop and cultivate intuition in our future

leaders. Failure to do so could consign our military to a fate where officers are

"mesmerized by high technology"[28] and incapable of separating themselves from their

computer models and decision support systems. Again Harig warns that "multisensory

information systems might make our leaders fear to *guesstimate*, preferring to avoid

risking mistakes by substituting certainty models for their intuition."[29] We must avoid

the temptation to allow technology to force us into becoming reactive. Future leaders

will be tempted to cede all effective control to automation.[30] The Army's Force XXI

concept of direct sensor-to-shooter systems is an early example of this predictable

phenomenon. Some might argue that such a reduction of the human (or moral)

dimension in future conflict is a good thing. I disagree. The desensitization which would

result from reducing the effects of the moral domain of war may serve to trivialize its

brutality and inherent ugliness, thereby effectively removing the greatest deterrent to

armed conflict. Harig questions whether:

> "advanced technology, the increasing digitization of the
> battlefield, and the automation of combat systems [can]
> transform the experience of war into another video arcade
> game, an abstraction defined by the movement and
> deletions of computer icons?"[31]

He then tells about an officer who, in the pitch of virtual battle, swore at his terminal,

("Damn, I lost an icon!") as an overrun battalion was flagged by the computer.[32] This

lost battalion "icon" represented 1000 American men and women--real flesh and blood human beings, all with hopes and dreams. If this type of desensitization is a predictable byproduct of information-age warfare, we must strive to educate future commanders in the terrific difference between battle space and cyberspace.

V. SITUATIONAL FACTORS IMPACTING DECISIONMAKING.

A number of situational factors combine to influence the way we make decisions. Preeminent among these factors is **time**. When time is abundant, even vast quantities of information can be analyzed to support analytical decisionmaking. When time is constrained, however, intuitive decisions will be required to proactively dictate the terms of battle and to frame the situation to our advantage. Other contributing factors include capabilities of all parties: experience, temperament, freedom of action perceived by the decisionmaker, scope of the problem, novelty of the situation, role of the decisionmaker, and fluidity (impact of earlier decisions).[33]

Although all situational factors should be considered in selecting the best decisionmaking model, as we look to the future, we can make some generalizations about the likelihood of the environment and thereby narrow the range of options. The previous discussion of decisionmaking is largely based on published perspectives on the issue. Consider the future environment relative to the range of situational factors cited above:

a. **Time:** The speed at which decisions will be required will continue to accelerate, making time-sensitive decisions the norm, rather than the exception. A participant in a recent "Army After Next" wargame observed that during the futuristic

exercise, "We did little formal analysis--we were winging it--but when you have a marked technological advantage, you can afford to wing it and still win."[34] He went on to observe that, "Decisionmakers were forced to use their best judgment in a knowledge-poor environment--we had little time to analyze data or generate ideas for consideration."[35]

b. **Capabilities:** Leaders' capabilities will be enhanced through a renewed focus on education, as opposed to training. Critical thinking skills will improve over time with emphasis on educating leaders in *how* to think, as opposed to *what* to think. So future leaders will be more comfortable about relying on their instincts and intuitions and less inclined to rely on the alleged certitude of analytical models.

c. **Experience:** Increasingly sophisticated educational simulations will enhance experiential learning. Experience, albeit virtual, will be the primer for pattern-recognition-based decisionmaking, which will become the preferred methodology fin the future.

d. **Temperament:** Leaders' temperament will change over time to become less pragmatic and more situationally fluid. Habitual and characteristic inclinations will evolve, out of necessity, toward a greater acceptance of ambiguity and uncertainty. This evolution will occur partly as a result of the current trend toward leader training which is more conceptual than prescriptive. The US Army's 1993 version of FM 100-5, *Operations,* and TRADOC Pamphlet 525-5, *Force XXI Operations* are early examples of the trend toward a more conceptual doctrine, relying on **leadership** to "fill in the gaps" formerly addressed in doctrine.[36]

e. **Freedom of Action/ Role of the Decisionmaker:** Conventional wisdom holds that flatter information-age organizations will result in greater autonomy and freedom of action at lower levels. But the opposite will prove true. The technology-based capability of simultaneously shared situational awareness and the "CNN Effect" discussed earlier will combine to push decisions up the organizational hierarchy. Senior commanders will virtually be "on the ground," looking over the shoulder of subordinates. Most will be unable to resist the natural temptation to take charge. The Vietnam phenomenon of battalion commanders hovering above and "helping" company commanders and platoon leaders fight the battle will pale in comparison to the "help" junior leaders can expect in the future.

f. **Scope of the Problem:** Future problems will increase in depth and breadth as we advance into the information age. Greater interrelationships and interconnectivity between networked organizations will increase the complexity of determining second order, third order and more peripheral effects. Organizational interrelationships will be largely transparent to casual observation. This emerging reality mandates increased organizational efforts to analyze anticipated actions in order to predict the impact of decisions.

g. **Novelty of the Situation/Fluidity:** Given the accelerated pace of future change, situations will become increasingly new or non-routine. Leaders will be confronted regularly with situations that will not offer up a simple match with their past experiences. Tolerance for uncertainty with new situations will be an ongoing challenge.

Upon assessing these factors, decisionmakers will have to decide whether to use an analytical model or a more intuitive approach (or some combination thereof).

Intuitive and analytical decisionmaking are different in many significant ways. In general, intuitive decisions tend to be more often tactical, where analytical decisions are more strategic. Intuitive decisions are usually informal, rather than formal; rapid rather than deliberate; satisficing rather than optimizing; experience-based rather than process-based; learned rather than trained; artistic rather than scientific; organic rather than mechanistic; and individual rather than team-derived.[37] Figure 2 depicts a summary of the differences.

Intuitive & Analytical DM Comparison

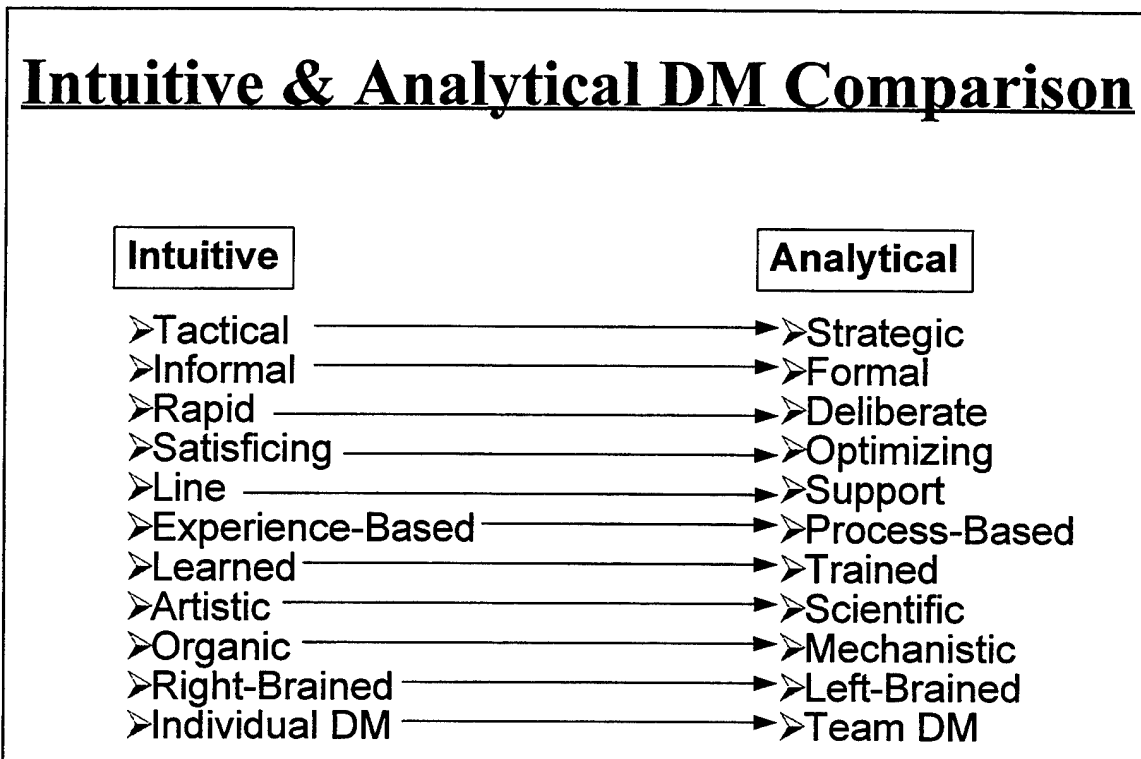| Intuitive	Analytical
➤Tactical	➤Strategic
➤Informal	➤Formal
➤Rapid	➤Deliberate
➤Satisficing	➤Optimizing
➤Line	➤Support
➤Experience-Based	➤Process-Based
➤Learned	➤Trained
➤Artistic	➤Scientific
➤Organic	➤Mechanistic
➤Right-Brained	➤Left-Brained
➤Individual DM	➤Team DM

Figure 2: Intuitive and Analytical DM Comparison[38]

The fast-paced nature of the future military environment will require decisions to be increasingly intuitive and less analytical than in the past. Effective intuitive decisionmaking requires the ability to create unique solutions from countless unclear possibilities, based largely on unquantifiable factors.[39] Experience is the key component to effective intuitive decisionmaking; it enables decisionmakers to recognize situations, within their range of understanding, as either typical or atypical.[40] When the situation is typical, the decisionmaker will call upon his experience to truncate time-consuming analytical considerations and, by analogy, to quickly develop an acceptable solution. The quick decision then frees up time to refine execution planning. Where the situation is atypical, the decisionmaker will focus on understanding the environment or components thereof and will rely upon his previous education to derive reasoned conclusions from which an acceptable course of action can be developed.

The first decision confronting leaders in the future will be which decisionmaking model is most appropriate, considering all the situational factors discussed earlier. If time is abundant and an optimal solution is desired, analytical decisionmaking will continue to offer the best approach. When the decisionmaker recognizes the situational patterns from previous training or actual experience, and a satisficing solution is acceptable, a recognition-primed model will be best. Where time is extremely short, intuitive decisionmaking (an environment or situation-diagnosis focused form of recognition-primed decisionmaking) will be required. Thus future decisionmakers will need to relay on several models of decisionmaking.

VI. <u>ANALYTICAL DECISIONMAKING.</u>

Analytical problem-solving assumes that options be systematically generated. Weighted, objective criteria are used to analyze and evaluate each option. Options are rated against established criteria and scores are tabulated to determine the *best* solution to the problem.[41] Although a number of analytical decisionmaking models exist, the process outlined in Figure 3 is typical. This model is currently being trained at the U.S. Army War College and the Army's Center for Strategic Leadership. This linear model views decisionmaking as synonymous with problem-solving. For each problem/situation, a solution exists: The challenge is simply to find the "best" solution. The model is essentially optimizing. Although time-consuming, this process enacts a methodology that has served both military and civilian organizations effectively for many years.
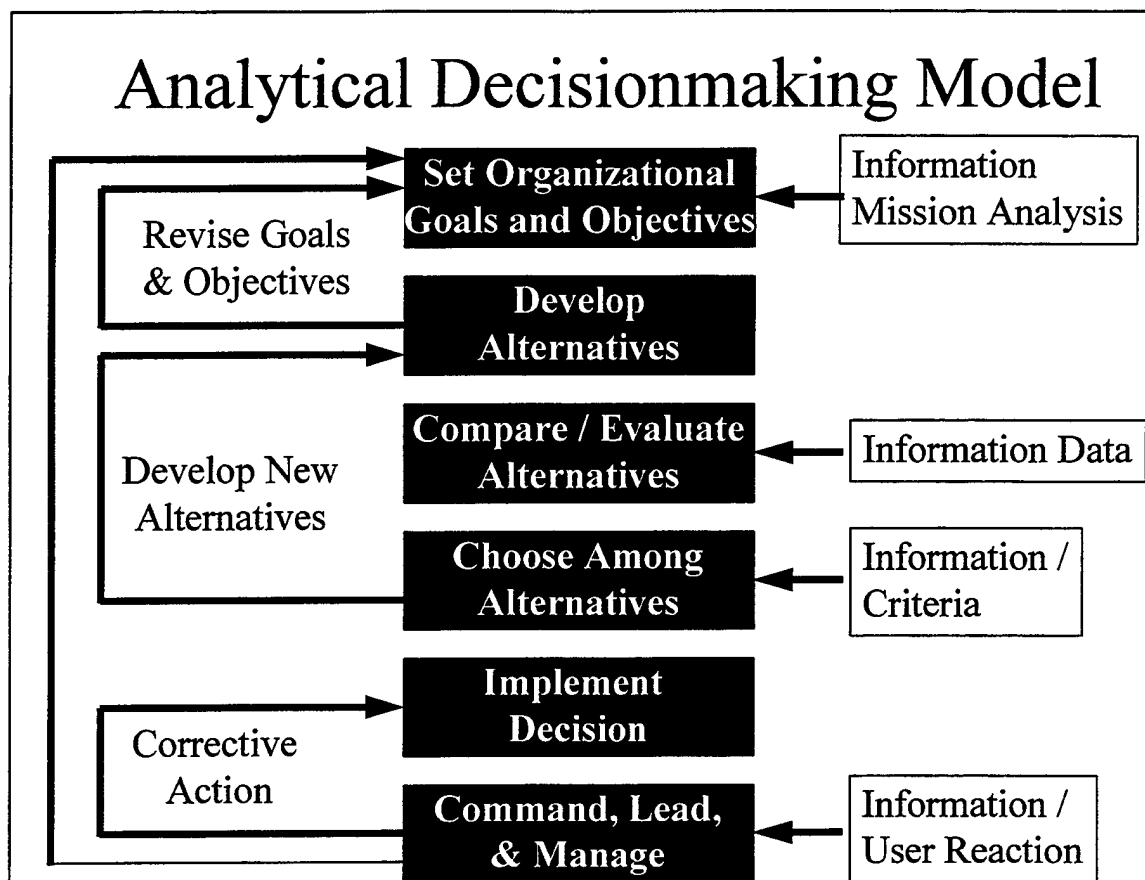
Analytical Decisionmaking Model

	Set Organizational Goals and Objectives	Information Mission Analysis
Revise Goals & Objectives		
	Develop Alternatives	
Develop New Alternatives	**Compare / Evaluate Alternatives**	Information Data
	Choose Among Alternatives	Information / Criteria
Corrective Action	**Implement Decision**	
	Command, Lead, & Manage	Information / User Reaction

Figure 3: Analytical Decisionmaking Model[42]

VII. RECOGNITION-PRIMED DECISIONMAKING (RPD).

A recognition-primed decisionmaking model was developed by Gary A. Klein in the mid 1980s to codify the decisionmaking methodology used by most military leaders in time-sensitive planning. (See Figure 4). This model is descriptive rather than prescriptive. Note how it contrasts with the analytical model:

a. The first option considered is usually workable, not randomly generated and selectively retained.

b. It generates and evaluates options serially, it does <u>not</u> compare evaluations.

c. It satisfices, but does <u>not</u> optimize.

d. It evaluates through mental simulation, <u>not</u> through decision analysis.

e. It focuses on elaborating and improving the chosen option, <u>not</u> on choosing among workable options.

f. It focuses on shared situational awareness, <u>not</u> on developing courses of action.

g. Its decisionmaking is primed to act, <u>not</u> to complete exhaustive analysis.[43]

Klein argues that senior military officers will readily adapt to his recognition-primed decisionmaking method, since experienced decisionmakers typically use this technique already. The recognition-primed decisionmaking model is simply an attempt to codify the way good decisionmakers have been making decisions for years. In his research of experienced military commanders, Klein determined that for routine decisions, 90% of leaders use a form of recognition-primed decisionmaking. Interestingly, even for non-routine decisions, 50-80% use recognition-primed decisionmaking techniques. For novices, the rate predictably drops to around 40%. In further contrasting experienced from novice military decisionmakers, he found that even when using an analytical decisionmaking model, experienced commanders focus primarily on the nature of the *situation*, where novices focus primarily on which *response* to select.[44]

The recognition-primed decisionmaking model can be effective in many situations. However, it is based on the principle that past actions (and outcomes) have relevance in addressing future challenges. This model thus depends on extrapolation of past experiences. Yet we have noted that the future may have little in common with the past. Historical perspective, while offering a valuable knowledge base, cannot be the sole primer for decisionmaking.[45] The recognition-primed decisionmaking model is experienced-based; therefore it is generally accepted by military commanders who value experience over education. Experience-based systems are specific and historical, while an education-based system is more general and conceptual. An experiential base will facilitate effective decisionmaking if the future resembles the past, whereas education-based decisionmaking enables leaders to adapt to a future that may have little relationship to the past. This is not to say that experience and education are mutually exclusive. On the contrary, they are both essential for effective decisionmaking. Hence, leaders need access to models that can call upon whichever attribute seems most relevant to a given situation.
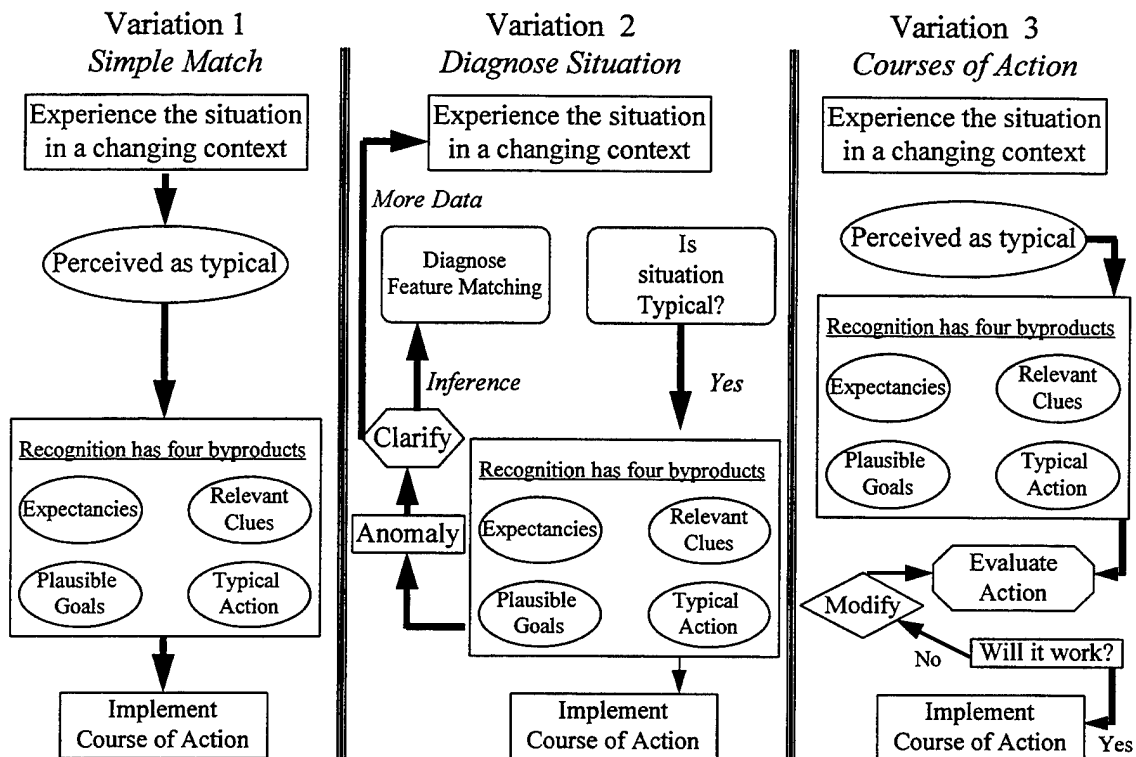
Recognition-Primed Decision Model

| Variation 1
Simple Match | Variation 2
Diagnose Situation | Variation 3
Courses of Action |

Figure 4: Recognition-Primed Decisionmaking Model[46]

VIII. INTERPRETIVIST CREATIVE ACTION-BASED DECISIONMAKING.

d.t. ogilvie has developed an action-based decisionmaking model which she refers

to as interpretivist. She asserts that:

> "in ambiguous environments, information is subjective and
> interpreted on the basis of idiosyncratic feedback and
> experience. Information under such conditions is therefore
> meaning*less* until individuals interpret and impose meaning
> on it. Action is based on interpretation, and interpretation
> is based on action."[47]

Since information is subject to multiple interpretations, there can be "no direct link

between information gathering and ambiguity reduction. She then advises that "the focus

must change to creating meaning through action and such meaning creation derives from

at least two techniques: acting to understand what happens, and imaging outside the

boundaries of rationality."[48] According to her, "these two competencies allow

decisionmakers facing ambiguous military situations to use creative action which yields

flexibility. Imaginative processes help decisionmakers to envision alternative future

paths toward which current actions can lead."[49] She concludes that an action-based

model creates knowledge through action.[50]

This action-based approach of decisionmaking, according to ogilvie:

> "emphasizes continually testing the environment and
> adapting accordingly. Learning is shifted toward skills of
> rapid adaptation and away from acting *correctly* within an
> expected environment. Therefore, decisionmakers move
> away from the posture of managing recurring surprises, and
> toward the skills of investigating an unfolding mystery."[51]

Future decisionmakers will thus create and define the environment through action, rather

than merely reacting to it.

In contrast to analytical models which collect information, generate alternatives,

estimate probabilities, select the highest cost/benefit alternative, and set parameters for

future sequential GO/NO GO decisions, the action-based model attempts to impose

interpretation while emphasizing environmental change through action, using creativity

to surmount theoretical barriers, allowing for boldness and proactivity.[52]

Figure 5 illustrates the leader's role in action-based decision-making in an

ambiguous environment. ogilvie acknowledges that an action-based model can

complement analytical decisionmaking, but should not replace it. Using a building

construction metaphor, she suggests that it would be inappropriate to ask a carpenter to

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build a house using a hammer alone. To be effective he works with a full toolbox, from which he selects the appropriate tool for the task at hand. It follows that we need to develop military leaders equipped with a full "toolkit" of decisionmaking resources, tailorable to best accomplish each new task in ever-changing environments.

ogilvie offers stimulating insights into future decisionmaking. Her cautions against relying on purely analytical decisionmaking in the information age are well worth heeding.
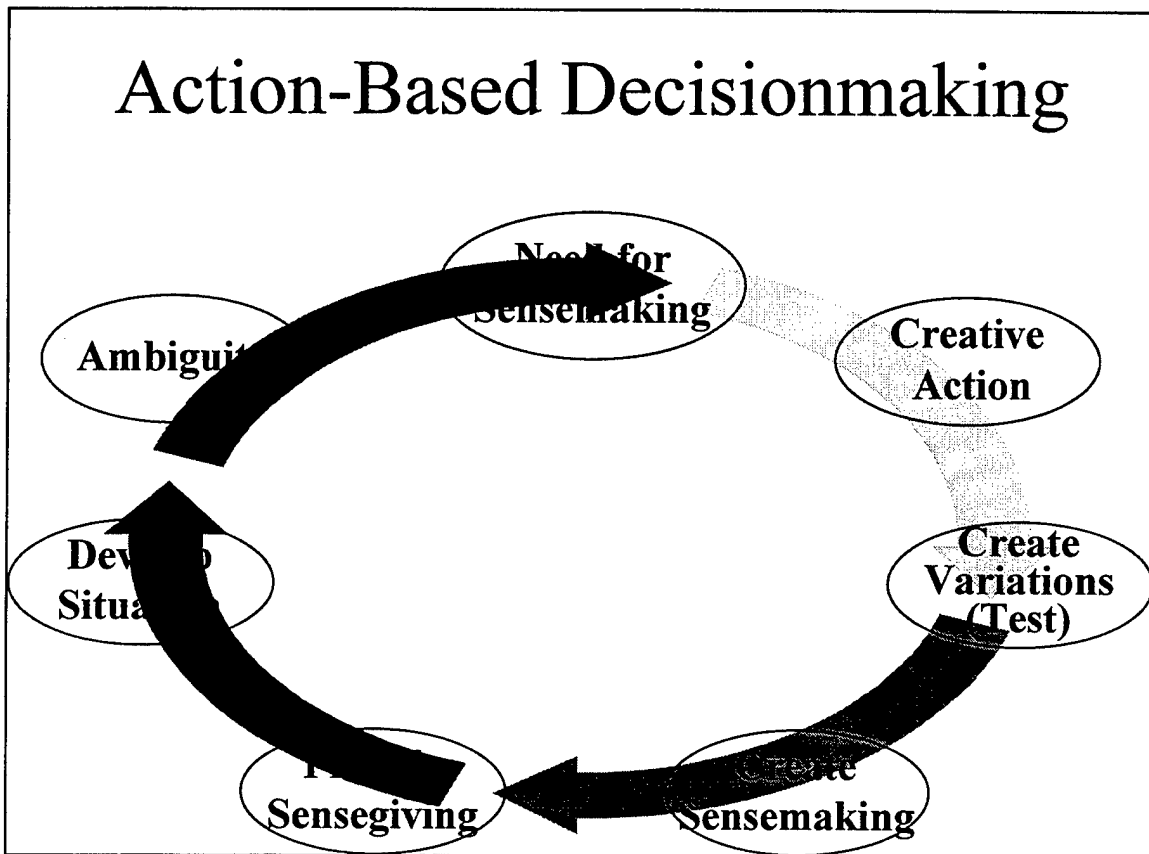
Action-Based Decisionmaking

Figure 5: Leader Role in Creative Action-Based Decisionmaking[53]

IX. THE DECISIONMAKING CONTINUUM.

A decisionmaking continuum specifies the range of options available to current
and future decisionmakers (see Figure 6). At one extreme is a purely intuitive decision,
although this seems more a theoretical limit than a practical option. Intuition is defined
as "immediate cognition--or the power of attaining direct knowledge or cognition without
evident rational thought and inference."[54] Realistically, most decisionmakers probably
use a form of recognition-primed decisionmaking based upon their knowledge, education,
and experience, to shape what outwardly appears to be an intuitive decision. There is
little "evident rational thought," because the rational thought used to arrive at the ultimate
decision was done in advance--a battle drill-like, automatized[55] response.

We have noted that the first decision required by leaders will be which
decisionmaking model is most appropriate in a given situation. Herb Barber of the U.S.
Army War College calls this initial move the "metadecision."[56] Regardless of which
model is chosen, the methodology of *observe, orient, decide, and act* will guide the
process. If a decisionmaker comes to rely on an action-based model, the sequence may
be altered (i.e. act, observe, orient, decide, act again). But the major components will not
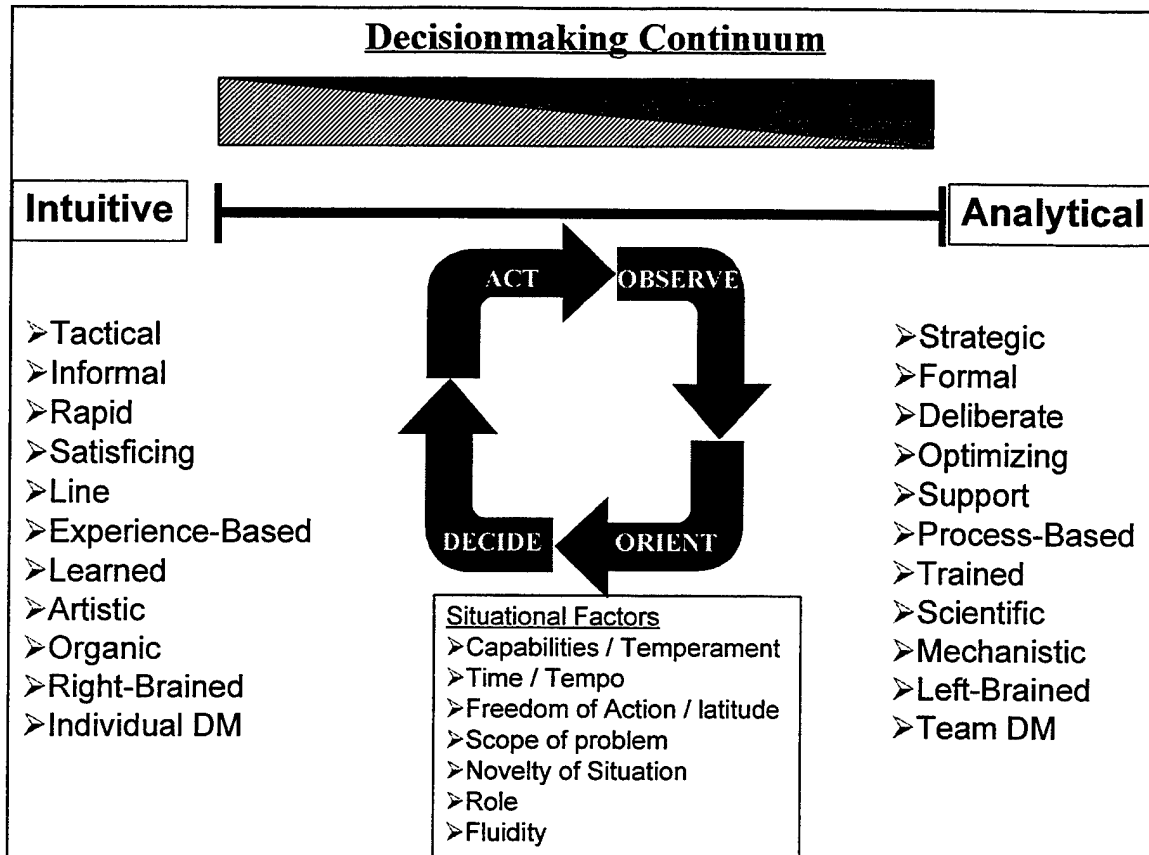otherwise change.

Decisionmaking Continuum

Intuitive — Analytical

Intuitive:
- Tactical
- Informal
- Rapid
- Satisficing
- Line
- Experience-Based
- Learned
- Artistic
- Organic
- Right-Brained
- Individual DM

ACT — OBSERVE — ORIENT — DECIDE

Situational Factors
- Capabilities / Temperament
- Time / Tempo
- Freedom of Action / latitude
- Scope of problem
- Novelty of Situation
- Role
- Fluidity

Analytical:
- Strategic
- Formal
- Deliberate
- Optimizing
- Support
- Process-Based
- Trained
- Scientific
- Mechanistic
- Left-Brained
- Team DM

Figure 6: Decisionmaking Continuum[57]

X. A PERSONAL EXPERIENCE IN RPD AND ACTION-BASED DECISIONMAKING.

The power of recognition-primed and action-based decisionmaking struck me while I recently played a popular video game with my four-year-old son. As we progressed through each successive and totally unfamiliar world, I stopped the game, read the instructions, and attempted to learn as much as I could about each new environment. My son, on the other hand, oriented himself to each new world with apparent ease. When we got to World Four, the screen quickly changed from green to bright blue and all the

familiar characters changed. Instead of running, as we had through World Three, we were now swimming--and the enemy characters looked different. As usual, I stopped the machine and began to review the instruction book. My impatient son scolded me: "Dad, just play!" I watched in amazement as my son effortlessly traversed through the new and dangerous world. On the other hand, I was killed in the first five seconds. I asked him how he knew where to go and what to do. He smugly explained that instead of running, we were now swimming. "The gremlins from World One are now jellyfish--the killer birds are now killer fish--it's easy!" Of course it was--a four-year-old figured it out! He recognized the patterns and felt comfortable in the unfamiliar setting. He also adapted to the speed at which the enemy attacks were increasing over time. While I was contemplating my next move, the enemy could quickly overwhelm me. I was thinking too much. My son had learned to test his environment through *action*. However, I knew there was more to his success than that. He seemed to have a *feel* for the game. He acted like a little Luke Skywalker--letting *the force* guide him as he confronted the countless challenges the game presented. He was developing his instincts--an intuitive feel for the game. Conversely, I was trying to analyze the environment and to seek options. The game never allowed me to develop a strategy. It moved too fast.

During the video game experience, I was awed by the freshness and spontaneity of my son's perspectives and performance. He was comfortable in an environment of flux, devoid of constancy. He was unintimidated by the unexpected. He was able to experience and evaluate emergent concepts, changing conditions, and events.

How different we are! I have been conditioned by an educational system

constructed on a "Newtonian culture of linear, cause-and-effect relationships and

predictable consequences."[58] I scientifically analyze to prove, but I do not test to learn.

My educational system has trained me to memorize the conclusions of others, rather than

to develop the intellectual flexibility to engage in creative, critical, and disciplined

thinking in order to draw my own reasoned conclusions.

Clearly, we all start out with fresh, innovative minds before our educational

system pounds us into conformity. Unless we dramatically change our teaching methods,

my son may soon tragically lose his apparent edge as our industrial-age educational

system unwittingly stymies his creativity and boldness.

In *A Whack on the Side of the Head*, Roger von Oech offers another example of

institutionally-imposed loss of creativity as he recalls his own high school education:

The teacher entered the classroom one day and impressed a small dot on the blackboard.

She asked the class what it was. After a few moments, one student said "It's a chalk dot

on the blackboard." The rest of the class seemed relieved that the obvious had been

stated, and no one else offered an alternative opinion. "I'm surprised at you," the teacher

told the class. "I did this same exercise yesterday with a kindergarten class and they

thought of fifty different things it could be: an owl's eye, a cigar butt, the top of a

telephone pole, a star, a pebble, a squashed bug, a rotten egg, and so on. They really had

their imaginations in high gear."[59] In the ten years between kindergarten and high school,

our educational system had suppressed the creativity of these otherwise bright young

people. They had been conditioned to find *the right answer*. Gone was their ability to

visualize and contemplate innumerable possibilities. Their narrow thinking, unfortunately, has become the *American Way.* von Oech offered yet another variation of the same theme by summarizing a recent study conducted by a leading business school. The school determined its graduates performed well immediately after graduation, but after ten years they had been overtaken by "a more streetwise, pragmatic group."[60] The researcher offered a distressing explanation: We taught them how to solve problems, not to recognize opportunities. "When opportunity knocked they put out their *Do Not Disturb Sign.*"[61]

Our thinking has traditionally been designed for routine, for habit, for automation and fixed procedure. We learned how to do something once and then gained proficiency by doing the same things over and over again.[62] We are now discovering that we can no longer rely on the past to guide our preparation for the future.[63] For the military, this may mean progressing beyond training to educating. Future military leaders will need to be both trained and educated. Task-oriented combat training is important and will continue to be so. However, today's highly charged and complex peacetime politico-military environment demands much more.[64]

X. CONCLUSIONS.

Effective decisionmaking is an iterative process. Effective decisionmakers call upon intuitive, recognition-primed, action-based, and analytical models. Future military leaders must possess skills such as vision, innovation, adaptability, creativity, experience-primed intuition, and the ability to simplify complexities and clarify ambiguities--all

while operating under environment-induced stress.[65] To prepare for the future, we must revolutionize the way we think and re-engineer the educational system through which we learn to think. Ideally this will begin long before an officer is commissioned in the military. The totality of the changes required to effectively transition to the information age is enormous. Ultimately we must alter the way we parent, the way we think, the way we educate, the way we train, and the way we communicate.

To address these onerous requirements, the military educational system should avoid the temptation to simply pass on its industrial-age culture and values to its young. We must begin to nurture leadership capacities and develop those intellectual skills and dispositions necessary for serious inquiry and reasoned decisionmaking.[66] Our culture should adapt not merely to tolerate, but to truly appreciate decisionmakers with the capability to draw their own reasoned conclusions based upon disciplined thought. Critical and creative thinking will be essential leader skills. The development of education-primed **and** experience-primed intuitive skills for operating in an environment characterized by uncertainty and ambiguity will become increasingly important as we leverage information technology to improve organizational decisionmaking.

Institutionally we must acknowledge that uncertainty is a natural and inevitable part of the dynamic of war. We must learn that uncertainty will not decrease as a consequence of the information-age. Rather it will remain generally constant. The decision cycles within which we will operate, however, will be shortened. In recognition of this emerging reality, we should abandon our almost mystical view of intuitive

decisionmaking and embrace it as a legitimate method for making time-sensitive

decisions.

Bottom line: The exigencies of information-age decisionmaking will force more

intuitive decisions, without the benefit of predictability and certainty which prompted us

to rely on analytical decisionmaking. Klein's Recognition-Primed Decisionmaking

Model, Variation 2 (Figure 7) offers the greatest applicability for information-age leaders.

Its focus on the environment or situation, rather than on course-of-action development

will serve future decisionmakers adequately, provided our educational system prepares

future users to make judicious applications of the model.

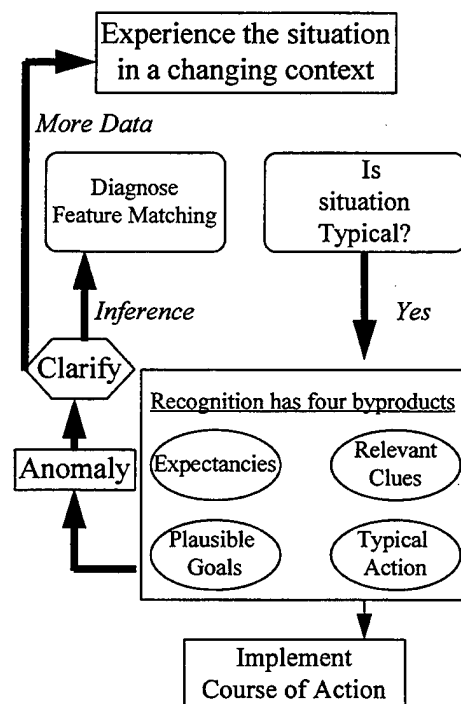# RPD Model--Variation 2: Diagnose Situation

Figure 7: Situation-Diagnosis, RPD Variation 2[67]

High resolution simulations available in the information-age will help to enhance the experiential learning of our officer corps. From pre-commissioning programs through military schools at all levels, we must break the current paradigm and begin to educate leaders in *how* to think. We should reward and encourage disciplined, reasoned, responsible thinking. Waiting for officers to arrive at a Senior Service College to introduce critical and creative thinking will become increasingly unacceptable. Offering electives at the US Army War College in critical and creative thinking is a classic example of *too little, too late*. These concepts must be woven into the entire curriculum of all military schools from Officer Basic and Advanced Courses, through the Command and General Staff College, and into the Senior Service Colleges.

The military already trains analytical decisionmaking extremely well and should continue to do so (not, however, to the exclusion of other techniques). We should spend more time training other models and cultivating the thought process used to determine which is situationally most appropriate. Only then will we *fill the toolkits* of our future leaders with the tools needed to be effective decisionmakers in the volatile, uncertain, complex, and ambiguous world in which we will operate. Richard Paul aptly sums it up:

> "The cruel illusion of security through permanence will
> continue to tantalize us, but we must prepare ourselves to
> live in flux rather than constancy, to be comfortable with
> the unexpected and problematic...ceaseless, incessant,
> perpetual adjustments to novel, unfamiliar iteracy will
> become the only permanent rule."[68]

Intuitive decisionmaking skills, enabled by simulation-based education, will provide the foundation for future success by establishing the preconditions for effective information-age decisionmaking.

ENDNOTES

[1] Department of the Army, <u>Force XXI Operations: A Concept for the Evolution of Full-Dimensional Operations for the Strategic Army of the Early Twenty-First Century</u>, TRADOC Pamphlet 525-5 (Fort Monroe, Virginia: U.S. Department of the Army, Headquarters, United States Army Training and Doctrine Command, 1 August 1994), 2.

[2] d.t. ogilvie and Frances E. Hauge, <u>Decision Making Requirements for Future Organizational Leaders</u>, A Pre-Symposium Paper submitted to the Leadership Challenges of the Twenty-First Century Army Symposium, 15 March 1996, 1.

[3] Gary A. Klein, "Strategies of Decision Making," <u>Military Review</u>, (May 1989): 56.

[4] ogilvie, 1.

[5] Klein, 56.

[6] COL Herbert F. Harback, Chairman, Department of Command, Leadership, and Management, US Army War College, personal communication with author, 1996

[7] Paul T. Harig, "The Digital General: Reflections on Leadership in the Post-Information Age," <u>Parameters</u>, VOL XXVI, NO. 3, (Autumn 1996): 135.

[8] Harig, 135.

[9] Richard Paul, <u>Critical Thinking: How to Prepare Students for a Rapidly Changing World</u> (Foundation for Critical Thinking, 1995), xii.

[10] Harback.

[11] Ibid.

[12] COL Robert Brace, Dean of Academic Affairs, US Army War College, personal communication with author, 1996.

[13] Record of Proceedings, Strategic Leadership Workshop, US Army War College, (Unpublished), 1-2 October 1996.

[14] Peter Hess and Julie Siciliano, <u>Management: Responsibility for Performance</u> (Western New England College, McGraw Hill, Inc., 1996), 194.

[15] Ibid., 194.

[16] Ibid., 195.

[17] Ibid., 195.

[18] Ibid., 196.

[19] ogilvie, 1.

[20] Ibid., 2.

[21] Ibid., 2.

[22] LTC Douglas R. Slater, US Army Armor Center, personal communication with author, 1996.

[23] ogilvie, 3.

[24] Ibid., 3.

[25] Ibid., 4.

[26] Ibid., 8.

[27] Harig, 138.

[28] Ibid., 139.

[29] Ibid., 140.

[30] ogilvie, 12.

[31] Harig, 138.

[32] Ibid., 138.

[33] Strategic Leadership Workshop, Record of Proceedings.

[34] COL Paul Cunningham, US Army War College, personal communication with author, February 1997.

[35] Ibid.

[36] TRADOC Pamphlet 525-5, p.iii.

[37] Strategic Leadership Workshop, Record of Proceedings.

[38] Ibid.

[39] MAJ John F. Schmitt, "How We Decide," Marine Corps Gazette (October 1995), 17.

[40] Schmitt, 18.

[41] Klein, 56.

[42] COL Chuck Ware, "Time-Sensitive Analytical Decisionmaking," briefing conducted at the Strategic Leadership Workshop, US Army War College, 1 October 1996.

[43] Gary A. Klein and Associates briefing given by Major John F. Schmitt at the Strategic Leadership Workshop, US Army War College, 1 October 1996.

[44] Klein, Military Review, 59.

[45] Strategic Leadership Workshop, Record of Proceedings.

[46] Klein, Strategic Leadership Workshop Briefing.

[47] ogilvie, 3.

[48] Ibid., 4.

[49] Ibid., 4.

[50] Ibid., 6.

[51] Ibid., 15.

[52] Ibid., 16.

[53] d.t. ogilvie, briefing given at the Leadership Challenges of the Twenty-First Century Army Symposium, 15 March 1996.

[54] Merriam Webster's Collegiate Dictionary, tenth edition, Merriam-Webster, Inc., 1993, p. 615.

[55] Learning theorists talk about automatization, the point where learned, conscious behavior has become so internalized that, to the outside (and perhaps to the doer), it seems unconscious.

[56] Dr. Herbert Barber, Professor of Behavioral Science, U.S. Army War College, personal communication with author, 1997.

[57] Strategic Leadership Workshop, Record of Proceedings.

[58] Harig, 134.

[59] Roger von Oech, A Whack on the Side of the Head (Warner Books, Inc. 1990), 24.

[60] Ibid., 27.

[61] Ibid., 27.

[62] Paul, 2.

[63] Ibid., 4.

[64] Steve F Kinds, "Train First but Educate Too," Army Times, 3 February 1997, p. 27.

[65] TRADOC Pamphlet 525-5, p.3.

[66] Donald L. Hatcher, "Critical Thinking and the Postmodern Critique of Rationality," <www.bakeru.edu/crit/papers.htm>, 20 January 1995, p.1.

[67] Klein, Strategic Leadership Workshop Briefing.

[68] Paul, xii.

BIBLIOGRAPHY

BOOKS

Hess, Peter, and Sciliano, Julia. <u>Management: Responsibility for Performance</u>. Western New England College: McGraw Hill, Inc., 1996.

Paul, Richard. <u>Critical Thinking: How to Prepare Students for a Rapidly Changing World</u>. Foundation for Critical Thinking, 1995.

Petersen, John L. <u>The Road to 2015</u>. Waite Group Press, 1994.

von Oech, Roger. <u>A Whack on the Side of the Head</u>. Warner Books, Inc 1990.

Webster's, Merriam. <u>Collegiate Dictionary</u>. 10th ed. Merriam-Webster, Inc, 1993.

PERIODICALS

Chilcoat, Richard A. "The Fourth Army War College: Preparing Strategic Leaders for the Next Century." <u>Parameters</u>, VOL. XXV, NO. 4, (Winter 1995-96).

Harig, Paul T. "The Digital General: Reflections on Leadership in the Post-Information Age." <u>Parameters</u>, VOL XXVI, NO. 3, (Autumn 1996).

Kagan, Fredrick. "Army Doctrine and Modern War: Notes Toward a New Edition of FM 100-5." <u>Parameters</u>, VOL XXVII, NO.1, (Spring 1997).

Kinds, Steve F. "Train First but Educate Too." <u>Army Times</u>, 3 February 1997.

Klein, Gary A. "Strategies of Decision Making." <u>Military Review</u> (May 1989).

Lawson, Chris. "Future Vision." <u>Navy Times</u> (28 October 1996).

Schmitt, MAJ John F. "How We Decide." <u>Marine Corps Gazette</u> (October 1995).

Schmitt, MAJ John F. " Fighting the Fog: Dealing with Battlefield Uncertainty." <u>Marine Corps Gazette</u> (August 1996).

UNPUBLISHED DOCUMENT

ogilvie, d.t. and Frances E. Hauge. <u>Decision Making Requirements for Future Organizational Leaders</u>. A Pre-Symposium Paper Submitted to the Leadership Challenges of the Twenty-First Century Army Symposium, 15 March 1996.

MILITARY PUBLICATIONS

U.S. Department of the Army. <u>Force XXI Operations: A Concept for the Evolution of Full-Dimensional Operations for the Strategic Army of the Early Twenty-First Century</u>. TRADOC Pamphlet 525-5. Fort Monroe, Virginia: U.S. Department of the Army, Headquarters, United States Army Training and Doctrine Command, 1 August 1994.

U.S. Department of the Army. <u>Operations</u>. Field Manual 100-5. Washington: U.S. Department of the Army, 14 June 1993.

INTERVIEWS / CONVERSATIONS

Barber, Dr. Herbert, Professor of Behavioral Science, US Army War College. Personal communication with author, 1997, Carlisle Barracks, PA.

Brace, COL Robert, Dean of Academic Affairs, US Army War College. Personal communication with author, 1996, Carlisle Barracks, PA.

Cunningham, COL Paul, Director of Reserve Component Affairs, US Army War College. Personal communication with author, 1997, Carlisle Barracks, PA.

Harback, COL Herbert F., Chairman, Department of Command, Leadership, and Managment, US Army War College. Personal communication with author, 1996, Carlisle Barracks, PA.

Slater, LTC Douglas R., US Army Armor Center. Personal communication with author, 1996, Carlisle Barracks, PA.

BRIEFINGS

Klein, Gary A. and Associates. Briefing given by Major John F. Schmitt at the Strategic Leadership Workshop, US Army War College, Carlisle Barracks, PA, 1 October 1996.

ogilvie, d.t. Briefing given at the Leadership Challenges of the Twenty-First Century Army Symposium, Cantigny, IL, 15 March 1996.

Ware, COL Chuck. "Time-Sensitive Analytical Decisionmaking." Briefing given at the Strategic Leadership Workshop, US Army War College, Carlisle Barracks, PA, 1 October 1996.

INTERNET ARTICLES

Hatcher, Donald L., <www.bakeru.edu/crit/papers.htm>, "Critical Thinking and the Postmodern Critique of Rationality." 20 January 1995, p.1.

OTHER PUBLICATIONS

Shambach, COL Stephen A. Strategic Decisionmaking in the Information Age. Report on the Strategic Leadership Workshop held at the US Army War College, Carlisle Barracks, PA, 1-2 October 1996.